SECTOR CASE STUDY

Retail

BG&E
Part of SYSTRA

Castle Towers

CIVIL | CONSTRUCTION ENGINEERING | FLOODING & HYDROLOGY | MATERIALS & DURABILITY| STRUCTURAL

SYDNEY, NSW, AUSTRALIA
CLIENT: QIC

BG&E provided structural civil engineering, materials and durability, flooding and hydrology, and construction engineering services for the $1 billion expansion of the Castle Towers Shopping Centre and surrounding precinct.

This project was highly complex, involving both significant technical capability along with an evolving scope.

BG&E was engaged in multiple packages of work for the Castle Towers project:

- Castle Towers Site A Redevelopment — ongoing.
- Castle Towers Site B Subdivision — ongoing.
- Castle Towers Zone 3 Redevelopment — ongoing.
- Pennant Street Roadwork Widening — delivered for IFC.
- Woodward Building Development — ongoing.

Castle Towers Site B Subdivision

QIC subdivided the old Castle Hill Public School site located opposite the existing Castle Hills Shopping Centre both on Pennant Street. The subdivision has created eight lots, all high-density mixed-use residential and commercial buildings, plus one park.

A key challenge of the Site B subdivision was the need to modify the original road designs to accommodate the proposed building from the Woodward Building Development that was relocated to within the subdivision site, before the roads in Site B were designed.

Castle Towers Zone 3 Redevelopment

Zone 3 of the Castle Towers Shopping Centre, originally opened in 1979, was redeveloped by QIC. The works involved partial demolition of the existing structure while maintaining other components of the building and ensuring key areas and tenant areas remained operational throughout construction.

All works were situated within the same structure, with the new structures extended above the existing retail sites and car park. The redevelopment involved:

- Upgrading existing retail spaces.
- Constructing a new, mixed-use building for commercial and retail use.
- Constructing a new hotel.

The Civil Engineering team's scope of services included stormwater design, onsite detention, water quality, overland flow, integration with the existing drainage system of the shopping centre, and design of public domain footpaths and driveways.

Significant challenges of the redevelopment included:

- Coordination with three different architects, each responsible for various aspects of the development.
- Management of services and civil items traversing the site, which was still operational and accessible to the public.
- The placement of onsite detention tanks which was complicated by the existing Sydney Metro tunnels beneath the site that limited options for underground installation, requiring placement within the proposed building structure.

Castle Towers — Sydney, NSW, Australia.

Macquarie Shopping Centre

MATERIALS & DURABILITY | STRUCTURAL

SYDNEY, NSW, AUSTRALIA
CLIENT: AMP CAPITAL

BG&E provided structural and material engineering services for the development application at Macquarie Town Centre.

The project involved the demolition of the existing ice rink and sections of the building to the north and east to create a new six level development comprising a basement car park (level one) and five levels of retail.

This development also included approved plans for residential and commercial towers above the retail precinct adjacent to Herring Road, as well as two additional levels of car parking above the existing rooftop car park along the Talavera Road frontage.

Key project achievements include:

- Completed testing of the existing columns whilst the shopping centre remained fully operational.
- Determined equivalent design strengths of the existing columns to validate existing structural drawings and reduce construction risks.
- Undertook localised column testing to reduce strengthening requirements from the additional imposed loads.
- Provided advice and testing that enabled a bracket strengthening system to be used, resulting in no loss of floor or ceiling space.

Darby Plaza

STRUCTURAL

NEWCASTLE, NSW, AUSTRALIA
CLIENT: GWH

Darby Plaza is a state-of-the-art work and lifestyle destination with premium office and retail space at 352 Hunter Street in Newcastle's CBD. The nine storey commercial building and public plaza is a key component of the inner-city revitalisation.

BG&E undertook structural engineering for GWH, realising the vision of the Darby Plaza as a community hub which includes suites from 100–5,022 square metres, a lobby cafe, informal meeting spaces, expansive outdoor landscaped plaza with alfresco dining, balconies with harbour views, and secure car parking. The development is targeting a 4.5 Star NABERS sustainability rating.

Offering a convenient commercial lifestyle, located close to world renowned beaches, parks, and Darby Street — known as Newcastle's Eat Street, Darby Plaza is set to boost growth of the community, supporting the City of Newcastle's vision to become a global city by 2030.

Piccadilly Theatre & Arcade

STRUCTURAL

PERTH, WA, AUSTRALIA
CLIENT: PALASSIS ARCHITECTS

BG&E was engaged by Palassis Architects to deliver structural engineering design works for the redevelopment of the heritage-listed Piccadilly Theatre and Arcade in Perth's CBD.

Originally constructed in 1938 and designed by William Leighton of Baxter Cox and Leighton for Claude de Bernales, the arcade connects the Hay and Murray Street malls and is renowned for its striking Art Deco architecture.

The redevelopment restored the building to its original state as a grand theatre with a repositioned proscenium and upgraded retail tenancies.

The development incorporated part of the existing buildings on the site, featuring a central retail arcade, additional retail and workshop tenancies above, and a cinema complex.

Key aspects of the redevelopment included:

- Installation of a new floor infill and lightweight roof at the Hay Street end.
- Construction of three new lifts (Hay Street lift, theatre goods lift, and Murray Street lift) and making necessary modifications to the existing building structure.
- A new steelwork "Fly Tower" structure to accommodate the repositioned theatre stage and proscenium.
- Structural upgrades to existing tenancies.
- A new rooftop plant platform above the Murray Street building.
- Installation of a new shop front structure throughout the ground floor arcade.

Plaza Arcade

STRUCTURAL

PERTH, WA, AUSTRALIA
CLIENT: YTL STARHILL GLOBAL REIT MANAGEMENT

The $8 million Plaza Arcade redevelopment included detailed design and construction support for the refurbishment of the arcade building and fit-out for the new Uniqlo tenancy.

BG&E was engaged directly by the client to form a design team with project managers AECOM and the architecture firm Buchan Group overseeing the project design.

The original structure was constructed in 1913. Since then, Plaza Arcade has undergone major refurbishments in the 1960s and early 2000s. As part of the new redevelopment, an additional storey was constructed over the existing structure, adding to the complexity of the job. Broad was appointed builder for the redevelopment.

Key features of the project included:

- Column strengthening works to accommodate a new storey addition.
- Demolishing and reconstructing newly combined foundations under the existing structure.
- Design of a new lightweight steel and concrete structure for a storey addition utilising Bondek, Hollowcore planks.
- Construction of a storey height truss to eliminate entry columns.
- Design of interfaces between the new and existing structure.
- Upgrades to the existing structure.

Direct Factory Outlet

CIVIL | STRUCTURAL

PERTH, WA, AUSTRALIA
CLIENT: VICINITY CENTRES

Direct Factory Outlet (DFO) Perth is a single storey retail centre comprising 118 specialty tenancies located within the Perth Airport Precinct. BG&E provided both civil and structural engineering services for the project.

The vision for DFO Perth was to be at the forefront of contemporary outlet design whilst retaining the industrial building language to respect its surroundings. Precast concrete façade panels and primary steel trusses provide an efficient building frame that was quick to install and reflects the iconic design intent.

BG&E's civil team provided services for the design of the site street car parking, stormwater drainage, pavement design and extension to High Street that connected to the site.

Significant effort was put into providing adequate jointing throughout the honed concrete mall slab to achieve an architectural "race track" mall configuration that allowed for curved floor panels around an internally facing food court area. The advantages of a precast façade and large floor slab panels were significant in meeting a challenging construction programme completed in 2018.

PAK'nSAVE

MATERIALS & DURABILITY | STRUCTURAL

NORTH ISLAND (MULTIPLE LOCATIONS), NEW ZEALAND
CLIENT: FOODSTUFFS NORTH ISLAND

BG&E has been supporting Foodstuffs North Island long-term goal to strengthen the seismic resilience of their retail portfolio across multiple North Island locations.

Engaged to deliver detailed seismic assessments and strengthening solutions, BG&E has applied its technical expertise to both structural and non-structural elements across a range of New World and PAK'nSAVE stores.

Our approach emphasises early-stage investigation and validation of existing documentation — key to reducing construction risks and avoiding unexpected costs. The result is a series of efficient, tailored solutions that align with Foodstuffs' operational needs and long-term asset strategy.

The programme included the following projects:

DSA Projects:

- New World Rototuna.
- New World Papakura.
- New World Remuera.
- New World Long Bay.

Seismic Strengthening Projects:

- PAK'nSAVE Taupo.
- New World Papakura.
- New World Tawa.
- New World Waiuku.
- PAK'nSAVE Kaitaia.
- PAK'nSAVE Whangarei.
- New World Hillcrest.
- New World Havelock North.
- PAK'nSAVE Palmerston North.
- New World Island Bay.

Resorts World Oceanarium

STRUCTURAL

SENTOSA, SINGAPORE
CLIENT: FABRITECTURE

BG&E was engaged by Resorts World Sentosa (RWS) to provide structural engineering services for the redevelopment of the Singapore Oceanarium (SGO) — formerly the S.E.A Aquarium.

The upgraded facility features a larger footprint and enriched exhibits to deliver an immersive and educational experience about marine life and the oceans.

The scope involved designing new structures and the modification of existing ones to accommodate new aquarium tanks, visitor areas, and back-of-house facilities.

This posed significant structural challenges, particularly in retrofitting existing structures to support large aquarium tanks while minimising disruption to the surrounding developments and existing infrastructure that required close coordination with specialist aquarium consultants.

The new Singapore Oceanarium now stands as a major attraction within RWS, seamlessly blending architectural ambition with structural ingenuity.

Key structural features included:

- New large-volume aquarium tanks that are supported by deep foundations.
- New reinforced concrete and structural steelwork elements to cater to increased loads.
- Integration of new and existing building systems.
- Complex construction staging and sequencing in a live environment.
- Extensive modifications to the existing basement and superstructure.

Resorts World Oceanarium — Sentosa, Singapore.

The SYSTRA Group — a global engineering and consultancy leader with 11,000 people worldwide — is now strengthened by BG&E's international buildings capability, complementing SYSTRA's long-established expertise in transport and mobility infrastructure.

Building on BG&E's reputation as a leading structural engineering practice delivering iconic, award-winning projects, the Group provides building solutions across complex and commercial developments, healthcare, education, data centres, adaptive reuse, and transport-related facilities worldwide.

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